

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	
Abhay S. Kant et al.	§	
	§	Group Art Unit: 2863
Serial No.: 10/720,817	§	
	§	Examiner: Lau, Tung S.
Filed: November 24, 2003	§	
	§	
For: METHOD AND APPARATUS	§	Atty. Docket: 133918-1/ SWA
FOR DETECTING RUB IN A	§	GERD:0332
TURBOMACHINE	§	

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APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37

This Appeal Brief is being filed in furtherance to the Notice of Appeal mailed on June 5, 2007, and received by the Patent Office on June 8, 2007, and also in furtherance to the Panel Decision mailed on July 16, 2007.

The Commissioner is authorized to charge the requisite fee of \$500.00 for this Appeal Brief, and any additional fees which may be necessary to advance prosecution of the present application, to Account No. 07-0868, Order No. 133918-1/ SWA (GERD:0332).

1. REAL PARTY IN INTEREST

The real party in interest is General Electric Company, the Assignee of the above-referenced application by virtue of the Assignment recorded at reel 014746, frame 0561, on November 24, 2003. Accordingly, General Electric Company, as the Assignee of the above-referenced application, will be directly affected by the Board's decision in the pending appeal.

2. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellants' legal representative in this Appeal.

3. STATUS OF CLAIMS

Claims 1-4, 51, 52, 54-58, and 60-75 are currently pending, are currently under final rejection and, thus, are the subject of this Appeal. Claims 5-50, 53, and 59 are cancelled.

4. STATUS OF AMENDMENTS

The Appellants have not submitted any amendments subsequent to the Final Office Action mailed on March 5, 2007. Consequently, there are no outstanding amendments to be considered by the Board.

5. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates generally to monitoring and diagnosis of turbomachine rubs. *See* Application, page 1, paragraph 1. More particularly, in certain embodiments, the invention relates to using algorithms which analyze data obtained from sensors monitoring various turbomachine operating conditions to determine when a rub event is occurring. The Application contains seven independent claims, namely, claims 1, 3, 4, 51, 52, 54 and 56. The subject matter of these claims is summarized below.

With regard to the aspect of the invention set forth in independent claim 1, discussions of the recited features of claim 1 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a system for detecting a rub in a turbomachine (*e.g.*, 10), the system comprising a turbomachine comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof. *See, e.g., id.*, paragraphs 25-31, 33-37, 39-43 and 45; *see also* FIGS. 1, 2, 5-14. The system also includes sensors monitoring turbomachine conditions. *Id.*, paragraphs 25-29, 39, 40, 42 and 45; *see also* FIGS. 2-14. The system further includes an on site monitor (*e.g.*, 12) in communication with the sensors, and loaded with instructions to implement a method for detecting whether a rub is occurring in the turbomachine between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. *Id.*, 25-29, 31 and 34-43; *see also* FIG. 1.

With regard to the aspect of the invention set forth in independent claim 3, discussions of the recited features of claim 3 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a computer implemented method for detecting a rub in a turbomachine (*e.g.*, 10), the method comprising monitoring (*e.g.*, 12) turbomachine conditions, wherein the turbomachine comprises a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof. *See, e.g., id.*, paragraphs 25, 26, 27, 28, 30 and 45; *see also* FIGS. 2-14. The method also includes determining whether a rub is occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. *Id.*, paragraphs 29, 31, 32, 42 and 43; *see also* FIGS. 2-14. The method further includes outputting an indication of the rub to a computer display (*e.g.*, 16).

With regard to the aspect of the invention set forth in independent claim 4, discussions of the recited features of claim 4 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a storage medium encoded with a machine-readable computer program code for detecting whether a rub is occurring in a turbomachine (e.g., 10). The storage medium includes instructions for causing a computer to implement a method comprising obtaining data indicating turbomachine conditions, wherein the turbomachine comprises a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof. *Id.*, paragraphs 25, 26, 27, 28, 30 and 45; *see also* FIGS. 2-14. The method also includes determining whether a rub is occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. *Id.*, paragraphs 29, 31, 32, 42 and 43; *see also* FIGS. 2-14. The method further includes outputting an indication of the rub to a computer display (e.g., 16).

With regard to the aspect of the invention set forth in independent claim 51, discussions of the recited features of claim 51 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a system comprising a turbomachine (e.g., 10) comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof. *See, e.g., id.*, paragraphs 25-31, 33-37, 39-43 and 45; *see also* FIGS. 1, 2, 5-14. The system also includes means for monitoring turbomachine conditions. *Id.*, paragraphs 25, 26, 27, 28, 30 and 45; *see also* FIGS. 2-14. The system further includes means for detecting whether a rub is occurring in the turbomachine between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. *Id.*, paragraphs 29, 31, 32, 42 and 43; *see also* FIGS. 2-14.

With regard to the aspect of the invention set forth in independent claim 52, discussions of the recited features of claim 52 can be found at least in the below cited

locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a system comprising a plurality of turbomachine sensors configured to couple to a turbomachine (e.g. 10) comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof, wherein the plurality of turbomachine sensors is configured to sense operational parameters of the turbomachine. *See, e.g., id.*, paragraphs 25-29, 39, 40, 42 and 45; *see also* FIGS. 2-14. The system also includes a rub detection system configured to monitor the plurality of turbomachine sensors and to detect a turbomachine rub event occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. *Id.*, paragraphs 29, 31, 32, 42 and 43; *see also* FIGS. 2-14.

With regard to the aspect of the invention set forth in independent claim 54, discussions of the recited features of claim 54 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a system comprising a rub detection system configured to monitor operational parameters of a turbomachine (e.g. 10) comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof, wherein the rub detection system is configured and to detect a turbomachine rub event occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. *See, e.g., id.*, paragraphs 29, 31, 32, 42 and 43; *see also* FIGS. 1-14.

With regard to the aspect of the invention set forth in independent claim 56, discussions of the recited features of claim 56 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a computer implemented method comprising analyzing turbomachine operational data to detect a rub event in the turbomachine (e.g. 10) comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof, wherein the rub event

occurs between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. *See, e.g., id.*, paragraphs 25-31, 33-37, 39-43 and 45; *see also* FIGS. 1, 2, 5-14. The method also includes outputting an indication of the rub event to a computer display (e.g., 16).

6. GROUND S OF REJECTION TO BE REVIEWED ON APPEAL

First Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the rejection of claims 1, 3, 4, 51, 52, 54-58, and 60-75 under 35 U.S.C. § 102(b) as anticipated by (U.S. Patent No. 4,478,082, hereinafter “Sato”).

Second Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the rejection of claim 2 under 35 U.S.C. §103(a) as being unpatentable over Sato in view of Turbine power systems conference (February 25-26, 2002).

7. ARGUMENT

As discussed in detail below, the Examiner has improperly rejected the pending claims. Further, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under Sections 102 and 103. Accordingly, Appellants respectfully request full and favorable consideration by the Board, as Appellants assert that claims 1-4, 51, 52, 54-58, and 60-75 are currently in condition for allowance.

A. Ground of Rejection No. 1:

The Examiner rejected claims 1, 3, 4, 51, 52, 54-58, and 60-75 under 35 U.S.C. § 102(b) as anticipated by (U.S. Patent No. 4,478,082, hereinafter “Sato”). Of the remaining pending claims, rejected claims 1, 3, 4, 51, 52, 54 and 56 are independent and will be discussed in detail below.

Legal Precedent

First, the pending claims must be given an interpretation that is reasonable and consistent with the *specification*. See *In re Prater*, 415 F.2d 1393, 1404-05, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969) (emphasis added); see also *In re Morris*, 127 F.3d 1048, 1054-55, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); see also M.P.E.P. §§ 608.01(o) and 2111. Indeed, the specification is “the primary basis for construing the claims.” See *Phillips v. AWH Corp.*, No. 03-1269, -1286, at 13-16 (Fed. Cir. July 12, 2005) (*en banc*). One should rely *heavily* on the written description for guidance as to the meaning of the claims. See *id.*

Second, interpretation of the claims must also be consistent with the interpretation that *one of ordinary skill in the art* would reach. See *In re Cortright*, 165 F.3d 1353, 1359, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); M.P.E.P. § 2111. “The inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation.” See *Collegenet, Inc. v. ApplyYourself, Inc.*, No. 04-1202, -1222, 1251, at 8-9 (Fed. Cir. August 2, 2005) (quoting *Phillips*, No. 03-1269, -1286, at 16). The Federal Circuit has made clear that derivation of a claim term must be based on “usage in the ordinary and accustomed meaning of the words amongst artisans of ordinary skill in the relevant art.” See *id.*

Third, anticipation under section 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a prior art reference to anticipate under section 102, every element of the claimed invention must be identically shown in a single reference. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). To maintain a proper rejection under section 102, a single reference must teach each and every limitation of the rejected claim. *Atlas Powder v. E.I. du Pont*, 750 F.2d 1569 (Fed. Cir. 1984). Accordingly, the Appellants need only point to a single element not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject

matter. The prior art reference also must show the *identical* invention “*in as complete detail as contained in the ... claim*” to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989).

Fourth, if the Examiner relies on a theory of inherency, the extrinsic evidence must make clear that the missing descriptive matter is *necessarily* present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. *In re Robertson*, 169 F.3d 743, 49 U.S.P.Q.2d 1949 (Fed. Cir. 1999) (Emphasis Added). The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient. *Id.* In relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art. *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). The Examiner, in presenting the inherency argument, bears the evidentiary burden and must adequately satisfy this burden. *See id.* Regarding functional limitations, the Examiner must evaluate and consider the functional limitation, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. *See* M.P.E.P. § 2173.05(g); *In re Swinehart*, 169 U.S.P.Q. 226, 229 (C.C.P.A. 1971); *In re Schreiber*, 44 U.S.P.Q.2d 1429, 1432 (Fed. Cir. 1997). If the Examiner believes the functional limitation to be inherent in the cited reference, then the Examiner “must provide some evidence or scientific reasoning to establish the reasonableness of the examiner’s belief that the functional limitation is an inherent characteristic of the prior art.” *Ex parte Skinner*, 2 U.S.P.Q.2d 1788, 1789 (Bd. Pat. App. & Inter. 1986).

The cited reference is missing features recited by independent claim 1, 3, 4, 51, 52, 54 and 56.

Turning to the claims, the present independent claim 1 recites, *inter alia*, “detecting whether a rub is occurring in the turbomachine between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.” Independent claim 3 recites, *inter alia*, “determining whether a rub is occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.” Independent claim 4 recites, *inter alia*, “determining whether a rub is occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.” Independent claim 51 recites, *inter alia*, “means for detecting whether a rub is occurring in the turbomachine between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.” Independent claim 52 recites, *inter alia*, “a rub detection system configured to ... detect a turbomachine rub event occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.” Independent claim 54 recites, *inter alia*, “a rub detection system configured to ... detect a turbomachine rub event occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.” Independent claim 56 recites, *inter alia*, “analyzing turbomachine operational data to detect a rub event in the turbomachine ... wherein the rub event occurs between tip portions of the plurality of blades and corresponding seal portions of the turbomachine; and.”

Sato does not teach or suggest that a rub is occurring in the turbomachine between *tip portions* of blades and *corresponding seal portions* of the turbomachine, as is generally recited by independent claims 1, 3, 4, 51, 52, 54 and 56. In the Final Office Action mailed on March 5, 2007, the Examiner referred to FIG. 1, units 9a, 9b and S of Sato and stated that Sato apparently discloses that a rub is occurring between the tip portions of blades and corresponding seal portions of the turbomachine. The Examiner further referred to FIG. 1 of Sato and stated that *the bearing is used as seal portions*.

In the “Response to Arguments” section on page 13 of the Final Office Action mailed on March 5, 2007, the Examiner responded to the Appellants’ arguments about the prior art of Sato not showing any rub occurring between tip portions of blades and corresponding seal portions. Appellants refer to FIG. 1 of Sato and respectfully point out that unit S is a rotary shaft of the rotor of a rotary machine, and units 9a and 9b are two journal bearings. The rotary shaft is journaled in 9a and 9b. Sato, col. 2, lines 47-51. Referring further to Sato, “FIG. 1 illustrates, for the purpose of explanation, that rubbing is occurring at a point R between the rotor and the stator 2 of the rotary machine 1.” Sato, FIG. 1; col. 2, lines 55-58. The rub in Sato’s rotary machine is, therefore, occurring between the shaft and its corresponding bearings and not between any tip portions of any blade and corresponding seal portions of the turbomachine, as recited in the present claims.

The Examiner’s remarks on page 13, lines 9-12 of the Final Office Action mailed on March 5, 2007, further reinforce this distinction between Sato and the present application. The Examiner referred to FIG. 1 and stated that “Sato discloses a rub condition on the turboshaft (fig.1, unit S) with any other part of the turbo components or any metal contacts thereof (Col. 2, Lines 5-11), including any seal or any mechanical structure that is attached to the shaft (this case is a blade)”. (Emphasis added). The quoted passage from Sato is cited below:

FIG. 9 is a graphic representation of the waveforms of output signals from the individual circuits shown in FIG. 8 to illustrate, for the sake of comparison, how the output waveforms vary depending on the occurrence of rubbing, the occurrence of abnormal metal-to-metal contact *at a bearing*, or simultaneous occurrence of rubbing and abnormal metal-to-metal contact. Sato, col. 2, lines 5-11 (Emphasis added).

Appellants respectfully reiterate that going by the passages cited and the comments of the Examiner, the Examiner is apparently equating a rub occurring between

the shaft and its corresponding bearings as in Sato with a rub between tip portions of the plurality of blades and corresponding seal portions of the turbomachine, as is the case with the present claims. The Sato reference, however does not mention any “seal portion” and the Examiner did not identify either the tip portions of the plurality of blades or the corresponding seal portions. Appellants respectfully emphasize that it is improper for the Examiner to disregard or dismiss claim language that distinguishes the claims over the prior art and *equate a shaft to a blade tip and a journal bearing to a seal portion*.

Further, in the “Response to Arguments” section on page 2 of the Advisory Action mailed on May 23, 2007, the Examiner responded to the Appellants’ earlier arguments about the prior art of Sato not showing any rub occurring between tip portions of blades and corresponding seal portions. The Examiner quoted the Abstract; Brief Summary; Detailed Description; column 8, starting lines 4; column 6, starting lines 61; and FIGS. 8-10 of Sato to assert that Sato shows a “rub between tip portions of plurality of blades and corresponding seal portions”.

Appellants respectfully reiterate that according to the passages cited in the Final Office Action mailed on March 5, 2007, the Advisory Action, and associated comments, the Examiner is apparently equating an “occurrence of abnormal metal-to-metal contact at a bearing of the rotary machine” as underlined by the Examiner in the reproduced Abstract, a “mechanical contact of its rotor with its stator during rotation of the rotary machine” as underlined by the Examiner in the reproduced Brief Summary, an “occurrence of rubbing between the rotor and stator of the rotary machine” as underlined by the Examiner in the reproduced Detailed Description, an “occurrence of abnormal metal-to-metal contact between the rotary shaft S of the rotor 20 and the bearing 21” as underlined by the Examiner in the reproduced Column 6, starting line 61 of Sato, with a rub between tip portions of the plurality of blades and corresponding seal portions of the turbomachine, as recited in the present claims. The Sato reference, however, does not

mention any “seal portion” and the Examiner did not identify either the tip portions of the plurality of blades or the corresponding seal portions.

Moreover, the Examiner stated that “the applicant recited some inherent features of the turbine in the claims and the Examiner has provided extrinsic evidence of inherent element of a turbine (specifically with it blade) use at the time of the invention.” The Examiner continued to state that “to serve as an anticipation when the reference is silent about an asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence”. Final Office Action, page 13, lines 13-18.

Appellants respectfully point out that regarding inherency limitations, if the Examiner relies on a theory of inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. *In re Robertson*, 169 F.3d 743, 49 U.S.P.Q.2d 1949 (Fed. Cir. 1999) (Emphasis Added). The mere fact that a certain thing may result from a given set of circumstances is not sufficient. *Id.* In relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). The Examiner, in presenting the inherency argument, bears the evidentiary burden and must adequately satisfy this burden. *See id.*

Appellants respectfully emphasize that in the present instance, in the absence of adequate basis in fact and/or technical reasoning to reasonably support the determination, the allegedly inherent characteristic of the rub between tip portions of the plurality of blades and corresponding seal portions does not necessarily flow from the teachings of the rub occurring between the shaft and its corresponding bearings of the applied prior

art. Accordingly, the Appellants respectfully request reconsideration and allowance of all pending claims.

Further, on page 2 of the current Advisory Action, the Examiner further reminded the Appellants that words in patent claims are given special meaning in the usage of the field of invention, unless the text of the patent makes clear that a word was used with a special meaning. The Examiner stated that in this case, the Appellants fail to present any specific definition and USPTO personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. Appellants, however, respectfully emphasize that the Examiner's interpretation is unreasonably broad and inconsistent with the specification. In view of these deficiencies, among others, the cited reference cannot anticipate independent claims 1, 3, 4, 51, 52, 54 and 56 and their dependent claims.

Dependent claims 62, 66, 68, 70, 72 and 74.

Dependent claims 62, 66, 68, 70, 72 and 74 recite a variety of features that are missing from the cited references, taken alone or in hypothetical combination. Each of these dependent claims recites, *inter alia*, a “plurality of blades is disposed on the rotor and the corresponding seal portions are disposed on the stator.”

Sato fails to teach or suggest the foregoing feature of the plurality of blades disposed on the rotor and the corresponding seal portions disposed on the stator as recited in dependent claims 62, 66, 68, 70, 72 and 74. In sharp contrast, Sato discloses a rub occurring only between a shaft and its corresponding bearings as discussed in detail above in relation to the argument on the 35 U.S.C. § 102(b) rejection of claims 1, 3, 4, 51, 52, 54 and 56. Appellants have carefully reviewed the sections (*e.g.*, Col. 2, line 50 and FIG. 1, units 9a, 9b and S) referenced by the Examiner and submit that these sections fail to disclose any plurality of blades being disposed on the rotor and the corresponding seal portions being disposed on the stator as recited in dependent claims 62, 66, 68, 70, 72 and 74. In view of the foregoing deficiencies in the teachings of the prior art, the reference

cannot establish a *prima facie* case of anticipation of claims 62, 66, 68, 70, 72, and 74. Accordingly, these claims are believed to be clearly patentable over the cited reference. Their reconsideration and allowance are respectfully requested.

For at least these reasons, among others, the Appellants respectfully request withdrawal of the rejections under 35 U.S.C. § 102.

B. Ground of Rejection No. 2:

The Examiner rejected claim 2 under 35 U.S.C. §103(a) as being unpatentable over Sato in view of Turbine power systems conference (February 25-26, 2002). Of the remaining pending claims, rejected claim 2 is dependent from independent claim 1 and will be discussed in detail below.

Legal Precedent

The pending claims must be given an interpretation that is reasonable and consistent with the *specification*. See *In re Prater*, 415 F.2d 1393, 1404-05, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969) (emphasis added); see also *In re Morris*, 127 F.3d 1048, 1054-55, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); see also M.P.E.P. §§ 608.01(o) and 2111. Indeed, the specification is “the primary basis for construing the claims.” See *Phillips v. AWH Corp.*, No. 03-1269, -1286, at 13-16 (Fed. Cir. July 12, 2005) (*en banc*). One should rely *heavily* on the written description for guidance as to the meaning of the claims. See *id.*

Interpretation of the claims must also be consistent with the interpretation that *one of ordinary skill in the art* would reach. See *In re Cortright*, 165 F.3d 1353, 1359, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); M.P.E.P. § 2111. “The inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation.” See *Collegenet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 75 U.S.P.Q.2d 1733, 1738 (Fed. Cir. 2005) (quoting *Phillips v. AWH*

Corp., 75 U.S.P.Q.2d 1321, 1326). The Federal Circuit has made clear that derivation of a claim term must be based on “usage in the ordinary and accustomed meaning of the words amongst artisans of ordinary skill in the relevant art.” *See id.*

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). In addressing obviousness determinations under 35 U.S.C. § 103, the Supreme Court in *KSR International Co. v. Teleflex Inc.*, No. 04-1350 (April 30, 2007), reaffirmed many of its precedents relating to obviousness including its holding in *Graham v. John Deere Co.*, 383 U.S. 1 (1966). In *Graham*, the Court set out an objective analysis for applying the statutory language of § 103:

Under §103, the scope and content of the prior art are to be determined, differences between the prior art and the claims at issue are to be ascertained, and the level of ordinary skill in the pertinent art are to be resolved. Against this background the obviousness or non-obviousness of the subject matter is to be determined. Such secondary considerations as commercial success, long-felt but unresolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. *KSR, slip op.* at 2 (citing *Graham*, 383 U.S. at 17-18).

In *KSR*, the Court also reaffirmed that “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *Id.* at 14. In this regard, the *KSR* court stated that “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does ... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *Id.* at 14-15. Traditionally, to establish a *prima facie* case of obviousness, the CCPA and the Federal Circuit have required that the prior art not only include all of the claimed elements, but also some teaching, suggestion, or motivation to combine the known elements in the same manner set forth in the claim at

issue. See, e.g., *ASC Hospital Systems Inc. v. Montifiore Hospital*, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984) (holding that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination.); *In re Mills*, 16 U.S.P.Q.2d 1430, 1433 (Fed. Cir. 1990) (holding that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination). In *KSR*, the court noted that the demonstration of a teaching, suggestion, or motivation to combine provides a “helpful insight” in determining whether claimed subject matter is obvious. *KSR*, *slip op.* at 14. However, the court rejected a *rigid* application of the “TSM” test. *Id.* at 11. In this regard, the court stated:

The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and explicit content of issued patents. The diversity of inventive pursuit and of modern technology counsels against limiting the analysis in this way. In many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature, will drive design trends. *Id.* at 15.

In other words, the *KSR* court rejected a rigid application of the TSM test which requires that a teaching, suggestion or motivation to combine elements in a particular manner must be explicitly found in the cited prior art. Instead, the *KSR* court favored a more expansive view of the sources of evidence that may be considered in determining an apparent reason to combine known elements by stating:

Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art all in order to determine whether there was an apparent reason to combine in the known elements in the fashion claimed in the patent at issue. *Id.* at 14.

The *KSR* court also noted that there is not necessarily an inconsistency between the idea underlying the TSM test and the *Graham* analysis, and it further stated that the broader application of the TSM test found in certain Federal Circuit decisions appears to be consistent with *Graham*. *Id.* at 17-18 (citing *DyStar Textilfarben GmbH and Co. v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (2006) (“Our suggestion test is in actuality quite flexible and not only permits but requires consideration of common knowledge and common sense”); *Alza Corp. v. Mylan Labs, Inc.*, 464 F.3d 1286, 1291 (2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires a teaching to combine ... “)).

Furthermore, the *KSR* court did not diminish the requirement for objective evidence of obviousness. *Id.* at 14 (“To facilitate review, this analysis should be made explicit. See *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”). As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”); see also, *In re Lee*, 61 U.S.P.Q.2d 1430, 1436 (Fed. Cir. 2002) (holding that the factual inquiry whether to combine references must be thorough and searching, and that it must be based on *objective evidence of record*).

When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d

1596 (Fed. Cir. 1988). The Federal Circuit has warned that the Examiner must not, “fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.” *In re Dembiczak*, F.3d 994, 999, 50 U.S.P.Q.2d 52 (Fed. Cir. 1999) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983)).

It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983); M.P.E.P. § 2145. Moreover, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959); see M.P.E.P. § 2143.01(VI). If the proposed modification or combination would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); see M.P.E.P. § 2143.01(V).

In addition, “it is well established that product claims may include process steps to wholly or partially define the claimed product.” *In re Luck*, 177 U.S.P.Q. 523, 525 (C.C.P.A. 1973). To the extent that “these process limitations distinguish the *product* over the prior art, they must be given the same consideration as traditional product characteristics.” *Id.* (emphasis in original). These claims are not product-by-process claims. A product-by-process claim defines a product by laying out the method steps required to produce the product. See *Atlantic Thermoplastics Co. Inc. v. Faytex Corp.*, 23 U.S.P.Q.2d 1481, 1490 (Fed. Cir. 1992). This is far different from a mixed limitation or hybrid claim that includes a functional limitation, but does not define the product solely by method steps. The general rule for interpreting hybrid claims is that all limitations are to be given patentable effect. See *In re Angstadt*, 190 U.S.P.Q. 214, 217 (C.C.P.A. 1976).

In order to rely on equivalence as a rational supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 U.S.P.Q. 340 (CCPA 1958); *see also* M.P.E.P. § 2144.06.

Deficiencies of rejection.

As stated above, independent claim 1 recites detecting whether a rub is occurring in the turbomachine between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. Sato fails to teach or suggest the foregoing features of independent claims 1 as discussed in detail above.

The secondary reference, as set forth in the 35 U.S.C. § 103(a) rejections above, does not obviate this deficiency of the Sato reference. The "Turbine power systems conference" reference fails to obviate the deficiencies of the Sato reference. The Examiner relied on the secondary reference solely for its disclosure of a server in communication with the on site monitor via an internet. However, the secondary reference does not teach or suggest detecting whether a rub is occurring in the turbomachine between tip portions of the plurality of blades and corresponding seal portions of the turbomachine. For at least this reason, among others, the hypothetical combination of the Sato reference and the "Turbine power systems conference" reference cannot support a *prima facie* case of obviousness of claim 2 or the other pending claims.

For at least these reasons, among others, the Appellants respectfully request withdrawal of the rejection under 35 U.S.C. § 103.

Conclusion

In view of the foregoing discussion, Appellants respectfully request that the Board reverse the rejections and indicate the allowability of the pending claims.

Respectfully submitted,

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8. **APPENDIX OF CLAIMS ON APPEAL**

Listing of Claims:

1. A system for detecting a rub in a turbomachine comprising;
a turbomachine comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof;
sensors monitoring turbomachine conditions; and
an on site monitor in communication with the sensors, and loaded with instructions to implement a method for detecting whether a rub is occurring in the turbomachine between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.
2. The system of claim 1 further comprising a server in communication with the on site monitor via an internet.
3. A computer implemented method for detecting a rub in a turbomachine, the method comprising:
monitoring turbomachine conditions, wherein the turbomachine comprises a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof;
determining whether a rub is occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine; and
outputting an indication of the rub to a computer display.
4. A storage medium encoded with a machine-readable computer program code for detecting whether a rub is occurring in a turbomachine, the storage medium including instructions for causing a computer to implement a method comprising:

obtaining data indicating turbomachine conditions, wherein the turbomachine comprises a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof;

determining whether a rub is occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine; and

outputting an indication of the rub to a computer display.

51. A system, comprising:

a turbomachine comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof;

means for monitoring turbomachine conditions; and

means for detecting whether a rub is occurring in the turbomachine between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.

52. A system, comprising:

a plurality of turbomachine sensors configured to couple to a turbomachine comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof, wherein the plurality of turbomachine sensors is configured to sense operational parameters of the turbomachine; and

a rub detection system configured to monitor the plurality of turbomachine sensors and to detect a turbomachine rub event occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.

54. A system, comprising:

a rub detection system configured to monitor operational parameters of a turbomachine comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof, wherein the rub detection system is configured and to detect a turbomachine rub event occurring between tip portions of the plurality of blades and corresponding seal portions of the turbomachine.

55. The system of claim 54, comprising a turbomachine, wherein the rub detection system is coupled to the turbomachine.

56. A computer implemented method, comprising:
analyzing turbomachine operational data to detect a rub event in the turbomachine comprising a rotor, a stator, and a plurality of blades extending radially from the rotor, or the stator, or a combination thereof, wherein the rub event occurs between tip portions of the plurality of blades and corresponding seal portions of the turbomachine; and
outputting an indication of the rub event to a computer display.

57. The method of claim 56, comprising monitoring a turbomachine to obtain the operational data.

58. The method of claim 57, wherein monitoring comprises monitoring the turbomachine on-site.

60. The method of claim 57, wherein monitoring comprises monitoring the operational data in real time.

61. The method of claim 56, wherein analyzing comprises detecting the rub event in real time with operation of a turbomachine.

62. The system of claim 1, wherein the plurality of blades is disposed on the rotor and the corresponding seal portions are disposed on the stator.

63. The system of claim 1, wherein the turbomachine conditions comprise bearing vibration, or temperature, or pressure, or eccentricity, or axial displacement, or load, or condenser pressure values, or any combination thereof.

64. The system of claim 3, wherein the blades are disposed on the rotor, or the stator, or any combination thereof and the seals are disposed on the rotor, or the stator, or any combination thereof.

65. The system of claim 3, wherein the turbomachine conditions comprise bearing vibration, or temperature, or pressure, or any combination thereof.

66. The system of claim 4, wherein the plurality of blades is disposed on the rotor and the corresponding seal portions are disposed on the stator.

67. The system of claim 4, wherein the turbomachine conditions comprise bearing vibration, or temperature, or axial displacement, or load, or condenser pressure values, or any combination thereof.

68. The system of claim 51, wherein the plurality of blades is disposed on the rotor and the corresponding seal portions are disposed on the stator.

69. The system of claim 51, wherein the turbomachine conditions comprise temperature, or eccentricity, or load, or condenser pressure values, or any combination thereof.

70. The system of claim 52, wherein the plurality of blades is disposed on the rotor and the corresponding seal portions are disposed on the stator.

71. The system of claim 52, wherein the operational parameters comprise temperature, or load, or condenser pressure values, or any combination thereof.

72. The system of claim 54, wherein the plurality of blades is disposed on the rotor and the corresponding seal portions are disposed on the stator

73. The system of claim 54, wherein the operational parameters comprise eccentricity, or axial displacement, or load, or condenser pressure values, or any combination thereof.

74. The method of claim 56, wherein the plurality of blades is disposed on the rotor and the corresponding seal portions are disposed on the stator.

75. The method of claim 56, wherein the operational data comprises data relating to temperature, or pressure, or eccentricity, or any combination thereof of the turbomachine.

9. **EVIDENCE APPENDIX**

None.

10. **RELATED PROCEEDINGS APPENDIX**

None.